THE EFFECTS OF UNCERTAINTY ON GROWTH

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CONTENTS

ABSTRACT

This paper aims to examine the impact of uncertainty on growth. In other words, this is an effort to investigate the relationship between uncertainty and economic growth. Data from 35 countries during the period 1985-2015 are used. This relationship is estimated using panel data regressions. The main finding of the paper is that uncertainty of gdp, inflation and unemployment is a negative determinant of growth.

The project proceeds as follows:

The first section named as literature review consists of a brief presentation of the theories and project results developed by now regarding the relationship of uncertainty and growth.

The second part of the paper includes the empirical study, the main results and the analysis of the findings.

The final part provides a summary and some closing remarks.

METHODOLOGY

The sample of the data includes statistical observations from 35 countries for a period of 30 years (1985-2015). This panel data sample is used for all the regressions performed. More detailed information about the dataset could be found at the data appendix of the paper.

First, it is necessary to clarify that uncertainty is divided by sector in three variables. We examine how gdp uncertainty, inflation uncertainty and unemployment uncertainty influence growth. Each uncertainty variable derives from the standard deviations of the variables' quarterly data.

So, at the beginning three separate panel data regressions are performed in order to estimate the effect of each type of uncertainty (gdp uncertainty, inflation uncertainty and unemployment uncertainty) on growth for all the countries and years. Furthermore, there is a division of the countries studied into European and non-European. In this case, there is an effort to see how growth is affected by each type of uncertainty in European countries and how in the non-European ones. This is examined with the use of dummy variables. At last, there is one more division. The time period is divided in two groups in order to measure how the kinds of uncertainty influenced growth during the period before the international economic crisis (1985-2006) and how after that (2007-2015).

All the panel data regressions of this paper have been performed in Stata in a model in which we control for country and time fixed effects and for the robustness of the standard errors.

LITERATURE REVIEW

There are too many different theories that associate uncertainty and economic growth. Some of them suggest that this relation is positive while others conclude that there is a negative association. The findings vary as each paper measures this relationship using a different dataset. Hereby, there is a short presentation of the most popular theories developed and the findings of econometrical studies. In fact, there are too many reasons to believe that there is a strong link between growth and uncertainty either positive or negative.

Salton and Ely (2017) use mean and panel GARCH in mean models to estimate the relationship between the growth of industrial production and its volatility. Their investigation suggests that the correlation between economic growth and its volatility is positive in developed countries but ambiguous in emerging economies.

Aghion et al (2010) share the same findings presenting a differentiated explanation on this theory. They use stylized facts for their study and they conclude to the fact that the relationship between uncertainty and growth may be positive in developed countries and negative in emerging countries. They declare that credit constraints may define the impact of uncertainty on growth. It is important to mention at this point that there results are compatible with the theories of irreversible investments and precautionary savings.

Black (2010) states that high growth volatility is followed by high rates of growth as someone would proceed to a risky investment only if the expected returns are high enough to compensate for. In other words, according to Black, when investing in riskier assets or securities during periods of uncertainty the expected growth rate of output is increased.

Aiyagari (1994) says that precautionary savings influence the relationship of growth and uncertainty. He suggests that risk averse agents would certainly increase the savings in times of uncertainty and wouldn’t proceed to any investments. They would only generate expectations for future investments when the returns expected would be higher.

Bernacke (1983) and Pindyck (1991) argue that uncertainty affects growth negatively. They both justify their statement by the theory which follows. They assume that economic agents face always a trade-off between investing in the short term or waiting for more information for long term investments. Supposing that the decisions of the agents are irreversible and the information about the long term investing projects are only released over time, the long term investments are postponed until the uncertainty of prices and the deviations are restored. In other words, this theory insists that in case of irreversibilities, the increased volatility may lower the investments and the growth rate.

Robert King et al (1988) examine a quite different model. They do incorporate endogenous growth in a real business cycle model. They advise that temporary disturbances to the production possibilities can permanently affect the output growth.

Having a different point of view, Joshua Aizenman and Nancy Marion (1993) construct a two-period equilibrium model which contains investment irreversibilities. This model shows that an increase in policy uncertainty leads to the reduction of development and growth.

Mirman (1971) concludes that when the agents have a precautionary motive for savings as a priority and the volatility is quite high, the savings rate increases. Hence, the investment rate rises and that leads to higher growth rate.

Ramey and Ramey (1995) conduct an empirical analysis that demonstrates a strong negative link between uncertainty and growth. They use panel data for a set of 92 countries and a subset of OECD countries. Their main finding is that countries with higher volatility have lower mean growth.

There are some researches that show a statistical relationship between volatility and output. First, Zarnowitz and Louis Lambros (1987) suggest through their research that a rise in the uncertainty of inflation has a short-run negative effect on GDP growth. Moreover, Roger Kormendi and Philip Meguire (1985) find that higher standard deviations of output growth rates are associated with higher mean growth

rates. Kevin B. Grier and Tullock (1989) conclude to the same finding using broader data. Finally, Aizenman and Marion (1993) who examine a similar model find that there is a negative relationship between policy uncertainty and development.

Fountas, Karanasos and Kim (2006) use a GARCH model of inflation and output growth to examine the relationship between macroeconomic uncertainty and macroeconomic performance. Their main finding is that inflation is a negative determinant of growth. They also find that the variability in business cycles and the rate of economic growth are closely related.

EMPIRICAL STUDY

The data appendix below gives more precise information concerning the data used for the regressions of this paper:

Variable	Description
Country	The samples of data consists of 35 countries Australia, Austria, Belgium, Canada, Switzerland, Chile, Czech Republic, Germany, Denmark, Spain, Estonia, Finland, France, United Kingdom, Greece, Hungary, Ireland, Iceland, Israel, Italy, Japan, Korea, Luxembourg, Latvia, Mexico, Netherlands, Norway, New Zealand, Poland, Portugal, Slovakia, Slovenia, Sweden, Turkey, USA
Year	This paper examines the period from 1985 to 2015
Growth	This indicator is measured in percentage change from previous year and is based on real GDP
Real GDP	GDP yearly data are measured in million US dollars at current prices and PPPs
GDP uncertainty	This variable is constituted by the standard deviations of Real GDP's quarterly values
Inflation uncertainty	This variable derives from the standard deviations of inflation's quarterly data
Unemployment uncertainty	This variable consists of the standard deviations of unemployment's quarterly observations
Population growth rate	This indicator is measured in terms of annual growth rate
Saving rate	This indicator is measured as percentage of GDP
Lgdp	This variable derives from the logarithm of the real GDP values
Crisis	This is a dummy variable which nulls for the period before the economic crisis (1985-2006) and equals to 1 since the beginning of the economic crisis (2007-2015)
Eurocountries	This is a dummy variable which nulls when the countries are not European and equals to 1 for the European ones.

The tables below present the effects of the uncertainty on Growth using data for 35 countries and for the time period 1985-2015. So, the dependent variable for the whole research is Growth. Each column states the results of a regression model performed. The values in the parenthesis are the robust standard errors. The coefficients are examined in a 95 % confidence interval. The values in brackets are the P-values of each variable which show their statistical importance. The log of the GDP, the saving rate and the population rate constitute the control group of the regressions. So, we will not focus on their analysis. There have been used some dummy variables across the econometric research. It is crucial to note that CRISIS is a dummy variable which nulls for the time period before the economic crisis (1985-2006) and equals to 1 for the time period after the economic crisis (2007-2015). Furthermore, EUROCOUNTRIES is a binary variable which nulls for the Non-european countries and equals to 1 for the European ones. In every regression, there is a control for the fixed effects and the robustness of the standard errors.

- TABLE I -

INDEPENDENT VARIABLES	**(1)**	**(2)**	**(3)**
LGDP	-.7330516 (.3324961) [0.034]	-.7420091 (.3369337) [0.035]	-.206601 (.3594603) [0.569]
GDP UNCERTAINTY	-.0674356 (.4313843) [0.877]	---	---
INFLATION UNCERTAINTY	---	-.0023687 (.0013985) [0.09]	---
UNEMPLOYMENT UNCERTAINTY	---	---	-2.375707 (.7802665) [0.004]
POPULATION RATE	.0170684	.0123367	.0645867

	(.1148259) [0.883]	(.1105751) [0.912]	(.102054) [0.531]
SAVING RATE	.2665659 (.0476116) [0.000]	.2635203 (.0471278) [0.000]	.2559639 (.0420503) [0.000]
CONSTANT	10.14477 (4.335247) [0.025]	10.23402 (4.300488) [0.023]	4.074956 (4.500204) [0.372]
R^2	0.1494	0.1485	0.1960
NUMBER OF OBSERVATIONS	1039	1037	1034

Column (1) on table I reports the results of the model below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust)

This is performed in order to examine the impact of gdp uncertainty on growth for the whole set of countries and for the whole period tested. So, having 1039 observations, the results suggest that gdp uncertainty influences negatively growth. More specifically, it the result suggests that if the gdp uncertainty increases by 1 % the growth will be reduced by 0.674 %. However, this value that occurred is not statistically important at a 95% confidence level. The 14.94 % of the variation of the dependent variable is interpreted by the explanatory variables of this model.

Column (2) of Table I shows the outcome of the regression below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust)

This is made to examine the effect of the inflation uncertainty on growth regarding the whole set of countries and the whole time period. There have been used 1037 for this regression. The R^2 for this model is 0.1485. This means that only the 14.85% of the variation of growth can be interpreted by this model. According to this

regression, the inflation uncertainty has a negative effect on growth. More particularly, if inflation uncertainty increases by 1 %, there will be a reduction of 0.002 % on growth. It is important to state that this value is both economically and statistically non-significant.

Column (3) of Table I presents the results of the regression below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \boldsymbol{\beta_2} UNEMPLOYMENT\_UNCERTAINTY_{\boldsymbol{it}} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust)

In this case, we measure the impact of unemployment uncertainty on growth in all countries for the whole time period. This model was performed using 1034 observations. It seems that the uncertainty in the unemployment rate has strong negative effect on growth. Ceteris paribus, if the unemployment uncertainty rate increases by 1% growth will be reduced by 2.375 %. It is crucial to report that this result is both economically and statistically important. Also, the model is quite satisfactory as a whole as it interprets the 19.60 % of the variability of growth.

-TABLE II -

INDEPENDENT VARIABLES	**(4)**	**(5)**
LGDP	0.6349373 (04396138) [0.158]	15.21541 (4.79816) [0.003]
GDP UNCERTAINTY	0.1576822 (0.2818895) [0.580]	-.1720068 (.8734095) [0.845]
INFLATION UNCERTAINTY	---	---
UNEMPLOYMENT UNCERTAINTY	---	---

POPULATION RATE	0.0825235 (0.0590962) [0.172]	.5193371 (.3878446) [0.189]
SAVING RATE	0.2317739 (0.0439077) [0.000]	.3102306 (.1231776) [0.017]
CONSTANT	-6.463758 (5.416977) [0.241]	-199.019 (-199.019) [0.003]
R^2	0.1838	0.2952
NUMBER OF OBSERVATIONS	759	280

Column (4) of Table II shows the findings of the regression model below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if CRICIS=0

This model measures the influence of the uncertainty in GDP level on growth in all countries. However, in this model there is a restriction in the time period. We only use the observations in years before the international economic crisis (1985-2006). In this case we only have 759 observations for the model and consequently only the 18.38% of the variation of growth is explained by it . We find that, ceteris paribus, during 1985-2006 if GDP uncertainty increased by 1 % growth would also be increased by 0.157. Consequently it seems that there is a positive impact on growth. This value is not statistically important though.

Column (5) of Table II reports the results of the regression model below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if CRICIS=1

The model examines the impact of gdp uncertainty on growth for all countries during 2007-2015. So, it measures this relationship since the beginning of the financial

crisis. For this time period it is shown that gdp uncertainty influences negatively the growth. More particularly, ceteris paribus, if gdp uncertainty rises by 1% the growth will be reduced by 0.172%. This value is neither statistically nor economically important. It should be mentioned that there have been used only 280 observations for this regressions and that the 29.52 % of growth variation is explained by that.

-TABLE III -

INDEPENDENT VARIABLES	**(6)**	**(7)**
LGDP	.6127496 (.4422349) [0.175]	10.92722 (3.75808) [0.006]
GDP UNCERTAINTY	---	---
INFLATION UNCERTAINTY	-.002226 (.000888) [0.017]	-2.010589 (.7634834) [0.013]
UNEMPLOYMENT UNCERTAINTY	---	---
POPULATION RATE	.0888415 (.0565111) [0.125]	.5202817 (.4429446) [0.248]
SAVING RATE	.2342564 (.0410549) [0.000]	.2545532 (.1356443) [0.069]
CONSTANT	-6.082079 (5.390519) [0.267]	-141.6919 (49.23313) [0.007]
R^2	0.1835	0.3662

NUMBER OF OBSERVATIONS	758	279

Table III shows the findings of the regressions (i – ii) below which measure the effect of inflation uncertainty on growth before and after the economic crisis.

(i): $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if CRICIS=0

(ii): $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if CRICIS=1

The main finding is that either before the crisis or after that, the impact of inflation uncertainty on growth is always negative. Also, both of the results are meaningful additions to the model as they are statistically significant. It is obvious though that the influence of the inflation uncertainty on growth is bigger since 2007. More specifically, it comes out that before the economic crisis a change in uncertainty of inflation by one unit would lead to the reduction of growth by 0.0022 %, which is quite negligible. However, an increase in inflation uncertainty by 1 % during 2007-2015 would reduce growth by 2.010%.

-TABLE IV -

INDEPENDENT VARIABLES	**(8)**	**(9)**
LGDP	.5044925 (.4046563) [0.221]	11.78789 (3.188296) [0.001]
GDP UNCERTAINTY	---	---
INFLATION UNCERTAINTY	---	---

UNEMPLOYMENT UNCERTAINTY	.7674696 (.6061659) [0.214]	-3.526436 (.7068673) [0.000]
POPULATION RATE	.0761051 (.0593415) [0.208]	.3820391 (.4553232) [0.407]
SAVING RATE	.2329853 (.0421884) [0.000]	.3066058 (.0982312) [0.004]
CONSTANT	-4.876918 (4.962016) [0.333]	-152.9175 (41.71653) [0.001]
R^2	0.1873	0.3832
NUMBER OF OBSERVATIONS	755	279

Table IV presents how the uncertainty of unemployment rate may affect growth.

Column (8) examines this relationship for the time period 1985-2006 (model (i)) while column (9) examines the same relationship for the time period 2007-2015 (model (ii))

(i): $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if CRICIS=0

(ii) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if CRICIS=1

The influence of unemployment uncertainty on growth seems to vary across the time periods. So it would be wiser to analyze them separately.

As shown in column (8) growth would increase by 0.767 % in case the unemployment uncertainty rate increased by 1 % before the economic crisis. This

value is not statistically significant. However, there have been 755 observations used. Since 2007, the values change dramatically. As column (9) illustrates, during 2007-2015 a rise of unemployment uncertainty rate by 1 % would lead to a reduction of growth at a level of 3.526 %. This result is totally significant statistically. Moreover, despite the few observations (only 279), model (ii) is satisfactory enough as it interprets the 38.32 % of the variation of growth.

-TABLE V -

INDEPENDENT VARIABLES	**(10)**	**(11)**
LGDP	-.3415828 (.6851558) [0.627]	-1.043842 (.3651225) [0.009]
GDP UNCERTAINTY	-.1515829 (.3566524) [0.678]	-.0492834 (.6395754) [0.939]
INFLATION UNCERTAINTY	---	---
UNEMPLOYMENT UNCERTAINTY	---	---
POPULATION RATE	-.3299522 (.4445614) [0.472]	.0757908 (.096113) [0.439]
SAVING RATE	.2046431 (.0489034) [0.001]	.3348543 (.094207) [0.002]
CONSTANT	5.954454 (8.983043) [0.520]	13.68253 (5.01991) [0.013]

R^2	0.1368	0.1761
NUMBER OF OBSERVATIONS	402	637

Coltumn (10) of the fifth table shows the results of the regression below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0

In this case, we try to figure out if and how gdp uncertainty influences growth in the countries of our project which are not European (please see the list of the countries examined at the data appendix). The impact of gdp uncertainty on growth seems to be negative. More specifically if the uncertainty for growth in non-European countries would be augmented by 1 %, the growth would be reduced by 0.151 %. This value is not economically or statistically significant though.

Column (11) of table V examines again the relationship between uncertainty and growth but only for the European countries examines at the project. Please see the regression model below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1

The finding for the European countries is quite similar to the one that applies to non-European. In European countries, during 1985-2015, in European countries, the gdp uncertainty affects negatively growth. More particularly, an 1% increase of uncertainty in gdp of European countries would lead to a 0.049% reduction of their growth. This finding is obviously not important economically or statistically.

Both of the models performed to examine the influence of gdp uncertainty on growth are not satisfactory despite the fact that there have been used enough observations as shown in Table V.

- TABLE VI -

INDEPENDENT VARIABLES	**(12)**	**(13)**
LGDP	-.6133649 (.623221) [0.344]	-1.046421 (.3839404) [0.013]
GDP UNCERTAINTY	---	---
INFLATION UNCERTAINTY	-.0794462 (.0261116) [0.010]	-.0015402 (.0010234) [0.147]
UNEMPLOYMENT UNCERTAINTY	---	---
POPULATION RATE	-.3903918 (.4640199) [0.417]	.0716734 (.0786823) [0.373]
SAVING RATE	.2098225 (.0422264) [0.000]	.3300072 (.0948313) [0.002]
CONSTANT	9.495423 (8.169082) [0.268]	13.70735 (5.018835) [0.013]
R^2	0.1658	0.1736
NUMBER OF OBSERVATIONS	402	635

Table VI reports the results of the regressions below:

(i)$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0

(ii)$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1

At this stage there has been an effort to examine the connection between inflation uncertainy and growth in European and non-European countries. Column (12) of table VI presents the findings derived by the regression (i). So, according to this research inflation uncertainty has a negative effect on growth in non-European countries. This result is totally significant statistically. However, it is not important enough economically as a change in inflation uncertainty by 1 % would only reduce growth by 0.0794 %. Quite a similar finding applies to the European countries as well. A 1% increase in inflation uncertainty would lead growth to a reduction of 0.0015%. This value is not statistically important though.

- TABLE VII -

INDEPENDENT VARIABLES	**(14)**	**(15)**
LGDP	-.2876384 (.6250393) [0.654]	-.0489471 (.3916112) [0.902]
GDP UNCERTAINTY	---	---
INFLATION UNCERTAINTY	---	---
UNEMPLOYMENT UNCERTAINTY	-.7888933 (1.004918) [0.448]	-2.909912 (1.05133) [0.012]

POPULATION RATE	-.2954001 (.4477759) [0.522]	.1023697 (.0844266) [0.239]
SAVING RATE	.1992063 (.0439212) [0.001]	.3381077 (.0712197) [0.000]
CONSTANT	5.296091 (8.299159) [0.535]	2.076105 (4.67591) [0.662]
R^2	0.1387	0.2520
NUMBER OF OBSERVATIONS	401	633

Column (14) of table VII shows the results of the regression described below:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0

This examines the impact of unemployment uncertainty on growth only in non-European countries. It is obvious that for these countries the uncertainty in unemployment slightly influences growth. According to our regression results, in case the uncertainty in unemployment increases by 1 %, growth will be reduced by 0.788%. It should be mentioned that this finding doesn't have a statistical or economic significance.

Column (15) of table VII reports the results of the regression shown below which examines how unemployment uncertainty influences growth in the European countries:

$GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1

For this set of countries, our findings suggest that there is a strong connection between unemployment uncertainty and growth. More particularly, having used 633

observations, we conclude that if unemployment uncertainty is raised by 1 %, growth would be decreased by 2.90 %. This result is totally significant at 1 95 % significance level.

- TABLE VIII -

INDEPENDENT VARIABLES	**(16)**	**(17)**	**(18)**	**(19)**
LGDP	.3423306 (.7677177) [0.664]	21.38353 (6.401655) [0.003]	.7285317 (.5096651) [0.168]	3.291115 (1.808667) [0.094]
GDP UNCERTAINTY	.3373688 (.4800595) [0.496]	-.0149441 (.7379767) [0.984]	.0400771 (.3034494) [0.896]	-2.049496 (.5214952) [0.002]
INFLATION UNCERTAINTY	---	---	---	---
UNEMPLOYMENT UNCERTAINTY	---	---	---	---
POPULATION RATE	-.2644246 (.3475216) [0.461]	-.3438459 (.57755) [0.558]	.0965081 (.0394059) [0.023]	.6756508 (.2054272) [0.006]
SAVING RATE	.1690578 (.0599501) [0.015]	.3549925 (.2486365) [0.168]	.3263271 (.0488549) [0.000]	.1663182 (.0475902) [0.004]
CONSTANT	-2.700853 (9.614269) [0.784]	-274.0392 (81.71084) [0.003]	-7.575066 (6.139733) [0.231]	-42.3415 (24.5901) [0.111]
R^2	0.1339	0.3594	0.2653	0.5069
NUMBER OF OBSERVATIONS	298	176	461	104

Table VIII presents the results of the regressions below:

(16) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0 & CRISIS=0

(17) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1 & CRISIS =1

(18) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1 & CRISIS =0

(19) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 GDP\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0 & CRISIS=1

All these regressions investigate the relationship between gdp uncertainty and growth in various cases. More particularly, as shown in column (16) gdp uncertainty influenced positively growth in non-European countries during 1985-2006. Moreover, as per column (17) the uncertainty of gdp affects negatively growth for the European countries during 2007-2015. Column (18) illustrates that during 1985-2006 gdp uncertainty used to have a positive impact in European countries. On the other hand, gdp uncertainty seems to have a strong negative effect on growth in non-European countries since the beginning of the financial crisis. All of these models are satisfactory enough as they succeed in interpreting a large percentage of growth's variation.

It should be mentioned that the results regarding the relationship of gdp uncertainty vary according to the datasets used.

- TABLE IX -

INDEPENDENT VARIABLES	**(20)**	**(21)**	**(22)**	**(23)**
LGDP	.1013003 (.8349162)	10.13405 (6.801297)	8.788387 (3.000748)	.7086093 (.4886124)

	[0.905]	[0.151]	[0.013]	[0.162]
GDP UNCERTAINTY	---	---	---	---
INFLATION UNCERTAINTY	-.0584545 (.0210047) [0.017]	-3.585804 (.9946945) [0.002]	-1.124231 (.3447279) [0.007]	-.0013198 (.0005082) [0.017]
UNEMPLOYMENT UNCERTAINTY	---	---	---	---
POPULATION RATE	-.3746618 (.4432321) [0.414]	-.6900831 (.4808659) [0.166]	1.407347 (.4273598) [0.006]	.0989979 (.039104) [0.019]
SAVING RATE	.1846833 (.0524426) [0.004]	.5395846 (.1198525) [0.000]	.1226939 (.0512648) [0.034]	.3247855 (.0455738) [0.000]
CONSTANT	.7369757 (10.43682) [0.945]	-128.7029 (87.18104) [0.155]	-117.7524 (40.67418) [0.013]	-7.284941 (5.827664) [0.225]
R^2	0.1487	0.4943	0.3498	0.2658
NUMBER OF OBSERVATIONS	298	175	104	460

Table IX depicts the findings if the regressions below which research the relationship between inflation uncertainty and growth.

(20) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0 & CRISIS=0

(21) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1 & CRISIS =1

(22) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0 & CRISIS =1

(23) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 INFLATION\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1 & CRISIS=0

Each model uses a different dataset and has some restrictions. More particularly, it occurs that before the economic crisis, the uncertainty of inflation influenced negatively growth in non –European countries. As column 21 illustrates, the connection between inflation uncertainty and growth is very strong in European countries during 2007-2015 as a 1%increase in inflation uncertainty would reduce growth by 3.58%. Column 22 reports the effect of gdp uncertainty on growth for the non-European countries during 2007-2015, when the economic crisis occurred. In this case the effect is still negative. Finally, as per column 23, inflation uncertainty had a negative impact on growth during 1985-2006 in European countries.

Consequently, inflation uncertainty always influences negatively growth. All the regressions performed are quite satisfactory and the variables used are explanatory enough. The results described above are all statistically significant.

- TABLE X -

INDEPENDENT VARIABLES	**(24)**	**(25)**	**(26)**	**(27)**
LGDP	.4664596 (.7992547) [0.570]	15.83784 (5.587452) [0.010]	9.507952 (2.247561) [0.001]	.3967241 (.5198801) [0.454]
GDP				

UNCERTAINTY	---	---	---	---
INFLATION UNCERTAINTY	---	---	---	---
UNEMPLOYMENT UNCERTAINTY	-1.219239 (1.450452) [0.417]	-3.724039 (.9825716) [0.001]	1.525852 (1.333114) [0.275]	1.330078 (.4002344) [0.003]
POPULATION RATE	-.2408458 (.4056295) [0.564]	-.6961973 (.6118288) [0.268]	1.270321 (.3910251) [0.007]	.0832257 (.0370496) [0.036]
SAVING RATE	.1743624 (.05306) [0.007]	.3716135 (.1801386) [0.052]	.2204989 (.0450873) [0.000]	.3090605 (.0500075) [0.000]
CONSTANT	-3.870581 (10.07861) [0.708]	-201.1682 (71.55518) [0.010]	-128.4792 (30.46148) [0.001]	-3.635819 (6.211744) [0.565]
R^2	0.1334	0.4658	0.3147	0.2829
NUMBER OF OBSERVATIONS	297	175	104	458

Table X presents the relationship between unemployment uncertainty and growth in various cases. The regressions can be seen below:

(24) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0 & CRISIS=0

(25) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1 & CRISIS =1

(26) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=0 & CRISIS =1

(27) $GROWTH_{it} = \beta_0 + \beta_1 lgdp_{it} + \beta_2 UNEMPLOYMENT\_UNCERTAINTY_{it} + \beta_3 POPULATION\_RATE_{it} + \beta_4 SAVINGRATE_{it} + u_{it}$, fe vce (robust) if EUROCOUNTRIES=1 & CRISIS=0

There is a great variation among the findings regarding the impact of unemployment uncertainty on growth due to the various datasets.

First, we can see in column (24) that before the rise of the economic crisis, uncertainty of unemployment used to influence negatively growth in non-European countries. This changed since the beginning of the economic crisis as seen in column (26). More specifically, in non-European countries, an 1 % increase of unemployment uncertainty would reduce growth by 1.219 % before the economic crisis but the same change would increase growth by 1.525 during 2007-2015. It should be mentioned that these results are not statistically important. Moreover, as shown in column (25), unemployment uncertainty has a strong negative effect on growth in European countrie since the beginning of the financial crisis. However, before the economic crisis, the uncertainty in unemployment had a positive effect in growth in European countries. The findings concerning the European countries are statistically significant.

CONCLUSION

The current project presents the relationship between uncertainty and growth. The main aim was to find the impact of uncertainty on growth. Having made a research using data for 35 countries during 1985-2015, we conclude to the fact that uncertainty (all types of it) is a negative determinant of growth.

Gdp uncertainty seems to influence growth mostly negatively. However, it should be noted that concerning our observations, the uncertainty of the gdp used to have a positive impact on growth before the beginning of the economic crisis both in European and non-European countries.

Moreover, according to this paper, the uncertainty of inflation has an adverse effect on growth in any case. Regardless the various restrictions of the regressions, the strong negative influence of inflation uncertainty on growth remains the same.

The uncertainty of the unemployment also seems to influence negatively growth in the analysis conducted. There is a slightly positive impact of unemployment uncertainty on growth during 1985-2006 in European and non-European countries.

It is not wise to compare the result of this paper to others as each project treats a different dataset and has a differentiated goal. It should be stated though, that the outcome of the project totally complies with the theory of the risk averse agents and the irreversibilities. All in all, according to this empirical study, there is a strong negative link between uncertainty and growth.

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